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# CERs from Least Developed Countries

## The African Perspective

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# CERs from Least Developed Countries: the African Perspective

by Christof Arens and Nicolas Kreibich*

## Introduction

With the post-2012 climate regime still undecided, the prospects of the CDM remain uncertain as well. There are, however, a number of encouraging signals, especially for countries which have been so far underrepresented in the CDM world: the EU, even in the absence of an international agreement on climate change, will continue to accept CERs for import into its emissions trading systems. Yet, this is limited to credits stemming from projects that start up before 2012. For projects that start after 2012, only credits from projects in Least Developed Countries (LDCs) are accepted. The revised EU Emissions Trading Directive and the EU Effort Sharing Decision both include further provisions fostering CDM project development in LDCs.

Furthermore, a number of CMP decisions support CDM project development in countries which have been underrepresented in the CDM pipeline thus far. CMP 3 (Bali, 2007) decided to exempt LDCs from paying the registration fee and the share of proceeds at CER issuance. CMP 5 (Copenhagen, 2009) expanded this provision to countries with less than ten registered projects. Furthermore, the EB was requested to undertake measures to support these countries, inter alia by developing tailored methodologies for GHG accounting and by implementing a loan scheme for project development and for covering the costs for validation and the first round of verification.

These developments at international and European level will foster demand for CERs stemming from CDM projects in LDCs. The question is whether this increased demand can actually be met with adequate supply. This article will therefore analyse the potential for CDM project development in Africa, in particular sub-Saharan Africa. Currently, 34 LDCs are located on the African continent.

## Technical opportunities for CDM projects in selected sub-Saharan LDCs

In order to identify the CDM potential of sub-Saharan Africa, Wuppertal Institute and GFA Envest have analysed selected sectors in eleven LDCs located in the region: Burkina Faso, DRC, Ethiopia, Malawi, Mali, Mozambique, Rwanda, Senegal, Tanzania, Uganda, Zambia.[1] Funded by the German Federal Environment Ministry BMU, this research is part of a larger research project which aims at fostering access to carbon finance for sub-Saharan African LDCs.

The assessment of the CDM potentials is partly based on existing literature and partly on own calculations. The study team analysed the potentials for renewable energy use, biomass residue use, end-use energy efficiency, and municipal solid waste, as well as industrial production processes. Projects under the emerging REDD+ scheme were excluded from the research due to the prevailing uncertainties of this project type. The sector potential findings, expressed in CERs per annum, are presented in Figure 1. The total technical abatement potential of all analysed sectors in the study region amounts to 128.6 mln CERs per annum.

The largest potentials in the sectors analysed were found for projects using biomass residues from agriculture, forests and woods. Agricultural residues, for example, comprise waste materials left in the fields

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[1] Arens, Christof, Martin Burian, *et al.*, 2011, *The CDM project potential in Sub-Saharan Africa with focus on selected least developed countries,* Wuppertal / Hamburg : Wuppertal Institute for Climate, Environment and Energy / GFA Envest: 2011 <www.jiko-bmu.de/1001>

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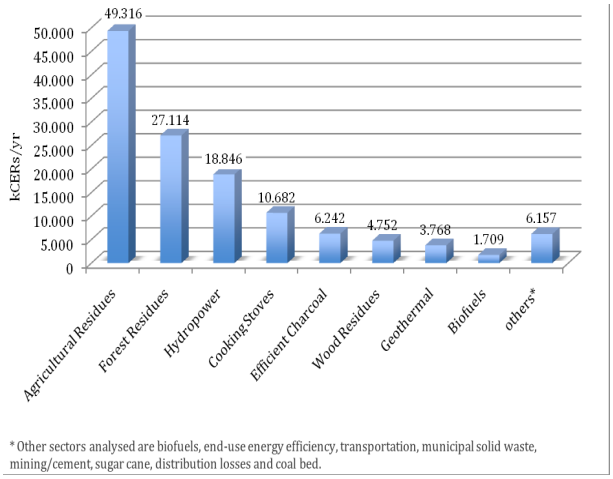


* Other sectors analysed are biofuels, end-use energy efficiency, transportation, municipal solid waste, mining/cement, sugar cane, distribution losses and coal bed.

**Figure 1.** Technical CDM potentials of selected sectors in 11 sub-Saharan LDCs (in kCERs/yr). *Source*: Arens et al., 2011, see footnote 1.

after harvesting, as well as by-products stemming from production processes which can be used for energy generation. By analysing these types of residues, the study revealed a huge CDM potential of up to 894 projects and 9,606 MW installed capacity in the study region. The largest potential for the use of agricultural residues for energy production in CDM projects was found in Ethiopia and Tanzania. For the eleven countries covered by the study a potential of 49 mln CERs/yr were identified for this sector.

The analysis of the forest and wood residue sector also revealed high CDM project potentials amounting to up to 31.8 mln CERs/yr. It is estimated that using forest residues that accrue from logging operations for energy production could offer more than 1,000 project opportunities, with the highest potentials lying in Ethiopia, DRC and Uganda. The use of wood residues (by-products of sawn wood production) also showed considerable emission reduction potentials with almost 100 project opportunities in the study region and expected emission abatement potentials of 4.7 mln CERs/yr.

As the largest part of household energy consumption in sub-Saharan Africa is used for cooking, replacing existing stoves with improved cook stoves can also drastically reduce fuel consumption and lead to considerable emission reductions. The analysis of this project type was limited to projects following the small scale methodology AMS.II.G, i.e. focused on the introduction of efficient cooking stoves using (partly) non-renewable biomass. A detailed assessment supported by own calculations yielded an overall potential of 10.6 mln CERs/yr, with the highest potentials lying in DRC, Tanzania and Uganda.

While the majority of wood extracted from African forests is directly used as fuel wood, an increasing fraction is being transformed into charcoal through a traditional, inefficient production process. By introducing more efficient low emission technologies, wood consumption could be reduced drastically, resulting in important GHG emission reductions. Considerable potentials for the implementation of this project type can be found especially in Tanzania, Uganda and Zambia, amounting to 1 mln CERs on average. Further promising potentials can be found in Mozambique, Malawi, Ethiopia and DRC.

In Africa, the huge potential of hydropower for energy production is still widely underutilized: estimates indicate that Africa currently only exploits 5 to 8% of its hydropower potential. Of the countries studied, Ethiopia and Tanzania show the largest opportunities for hydropower projects holding emission reduction potentials of 8.1 mln and 5.5 mln CERs/yr respectively. The overall hydropower potential for CDM projects in the study region has been estimated at about 18.8 mln CERs/yr. However, while these findings present hydropower as an interesting CDM opportunity, its exploitation comes with several risks attached. Not only could future climate variability make hydropower supply unreliable, but large hydroelectric projects can also have adverse social and environmental effects. These have to be carefully assessed when considering projects of this type and could prevent project development under the CDM.

Another energy source exploitable which has a large potential in Africa is geothermal energy. Currently, Africa already hosts 13% of all geothermal CDM projects of the overall global pipeline, including those under validation. This fraction could be further increased as several African countries have many underground reservoirs with high temperatures from which electricity can be produced. In the study region, opportunities for further using this energy source are especially high in the area of the Great Rift Valley. From the countries with available quantitative data, Uganda offers the highest potential for the implementation of geothermal projects, followed by Tanzania and Ethiopia.

Other CDM project opportunities in the region were found in the fields of Municipal Solid Waste management, combined heat and power projects (CHP) in sugar production, and energy efficiency. The study did not focus on transport other than biofuels and bus rapid transit, energy efficiency in buildings and domestic water heating so that potential CDM projects in these sectors have not been included in the above overview.

With regard to the geographical distribution of project potentials, the study revealed the largest CDM project and CER generation potentials in Ethiopia and Tanzania, followed by DRC and Uganda. Figure 2 illustrates the distribution of the project opportunities across the 11 countries analysed.

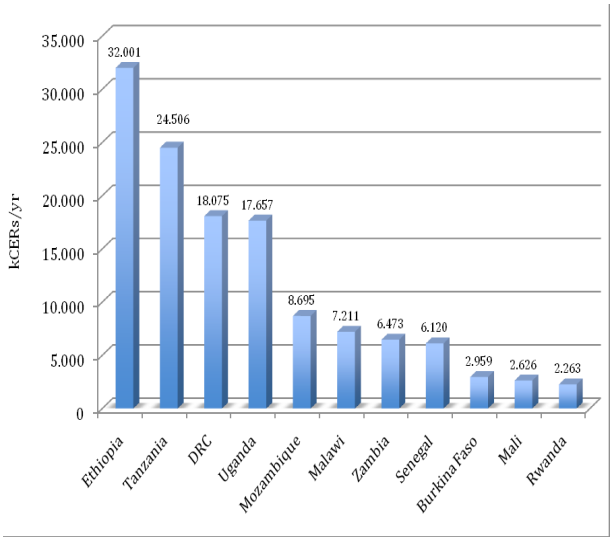


**Figure 2.** CDM potentials in selected sub-Saharan LDCs by country, *Source*: Arens et al., 2011.

## CDM in African LDCs – opportunities and barriers

The analysis presented above has been a purely technical assessment: what could the CDM portfolio in the study countries look like if all opportunities were used? However, for a balanced picture of potentials, also barriers to project development and implementation need to be explored. There are many barriers to implementing CDM projects in Africa. One major factor determining a country's CDM potential is the carbon intensity of the technology or capacity replaced by the CDM project. For the electricity sector, this intensity is measured by the Grid Emissions Factor (GEF) which is defined as the average carbon intensity of a host country's electricity system. Where applicable, the GEF was included into the sector potential analysis. It determines the CDM potential for on-grid renewable electricity projects and influences other projects types, such as, for example, forest and wood residues.

It was found that Burkina Faso, Mali, Rwanda, Senegal, Tanzania and Uganda have high GEF values making grid-connected CDM projects feasible: a high GEF implies a relatively strong emission reduction potential by a CDM project substituting electricity from the national grid. On the other hand, DRC, Ethiopia, Mozambique and Zambia have low GEF values, so that grid connected CDM projects currently have relatively low emission reduction potentials making these projects less attractive. No information was available for Malawi.

There are further factors hampering the implementation of CDM projects, such as the overall investment climate and the status of the local "Kyoto infrastructure". With respect to the latter, it was found that all study countries have established Designated National Authorities for the CDM (DNAs), which in principle allows for the development of CDM projects in the study region. Yet the pure existence of CDM-related institutions does not guarantee functioning procedures and an enabling institutional framework. A close look at the country-specific situation is therefore crucial.

Furthermore, projects have to overcome the problem of high upfront and transaction costs involved in CDM project planning and implementation, and project developers have to develop strategies to raise the capital needed. This is particularly difficult as high interest rates, limited awareness and involvement of local financial actors and investors, as well as high levels of corruption, represent severe barriers for the attraction of foreign investments in several LDCs in sub-Saharan Africa.

Other barriers include the lack of experienced project developers and weak or split incentives between decision-makers and technicians to pursue CDM opportunities. However, the distribution of these barriers differs from country to country. Moreover, a number of these barriers are being addressed by recent initiatives, some of which will be described in the following.

## Overcoming the barriers, mobilizing the capacities

Given the situation outlined above, Africa has seen a number of capacity building initiatives over the years. UNEP, the World Bank, and a number of other multilateral, as well as national development organisations, have conducted substantial support programmes.

A recent initiative by KfW Bankengruppe, for example, addresses the programmatic CDM approach. This approach offers great opportunities for project development in sub-Saharan Africa as it allows reaching small and diffused GHG sources which are hard to tap within single CDM projects. The KfW's Programme of Activities (PoA) Support Center provides advice and support to institutions and businesses implementing PoAs.[2] With regard to sub-Saharan Africa, it supports, for example, the development of SPEAR, a multi-country PoA targeting small-scale, grid-connected, renewable energy projects of up to 15MW in Kenya, Uganda, Tanzania, Rwanda and Burundi.

Another approach in dealing with the specific barriers CDM projects are facing in the region is being pursued by the African Carbon Asset Development (ACAD) facility. ACAD financially supports project development in its early to middle stages through local financial

[2] http://www.kfw.de/carbonfund

institutions, making it possible for projects that are not immediately fully financially viable to complete critical steps, such as PDD development and validation.[3] Furthermore, the facility also provides technical assistance to project developers and capacity building for local banks and investment funds, enabling them to better identify and handle carbon investment opportunities.

ACAD is also heading a consortium addressing the lack of a "regional baseline" for the South African Power Pool or other methodological solutions to cross-border grid-connected renewable energy projects, as explained above. What is more, with its recent revision of the tool to calculate the emission factor for an electricity system, the CDM Executive Board allowed the application of a more differentiated emission factor for imported electricity, improving the conditions for on-grid-projects in countries depending on electricity imports.

## Outlook

Due to the uncertain future of the CDM and in light of the preferential access of post-2012 CERs from LDCs to the EU-ETS, a continuous rise of demand for CERs from Least Developed Countries is likely. In order to account for this increasing demand, scaling-up of CDM project development in LDCs is urgently needed.

The technical emission reduction potential in African LDCs is in fact substantial. At the moment, however, unlocking this potential through the CDM is still hampered by substantial barriers. In the context of the underlying research project, a further investigation of country-specific barriers, as well as studies on cross-cutting LDC-related issues, such as suppressed demand, microfinancing and innovative ways for mobilizing capacity in a sustainable manner, will be undertaken.

The knowledge and experiences gained within the research will be broadly available to the public, with the aim at contributing to tapping the potentials and project opportunities in the region.[4]

[3] http://www.acadfacility.com

[4] Please check for further results and products: www.jiko-bmu.de/996